TRAFFIC ENGINEERING

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Robert O. Swain, *Editor*

Le Verne Johnson, *Managing Editor*

Associate Editors: Fred W. Hurd, Herbert A. Keegan, James E. Reading, Charles LeCraw, J. A. Carrothers, Margaret Woolverton, Henry Barnes.

Associate Technical Editors: F. B. Crandall, H. M. LeRoy.

Business Staff:

Norman Damon, *Circulation Manager* -- Russell Harrison, *Advertising Manager*
Joseph Havenner, *West Coast Circulation Manager*

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Frankly Speaking

RECENT newspaper accounts point to public concern about the traffic problem. If we believe what we read American cities are, according to the Wall Street Journal, "fighting a thus far losing fight against the spreading cancer of traffic congestion."

It is generally conceded in professional circles that we are adequately equipped to combat the problem of traffic congestion. Most persons whom we know and who are interested in the development and promotion of traffic facilities, are reasonably confident that the profession can not only cope with the problem but will, in time, provide attractive facilities which permit even greater expansion of highway transport.

But the question for the profession is not whether or not they can and will solve the traffic congestion problems, but whether or not the public can be properly appraised of what the profession can do. It is believed that question has not been fully answered.

It is becoming increasingly more necessary for highway and traffic engineers to publicize their abilities, their plans and their accomplishments in order to retain the confidence of the public and eliminate the pessimism of the press.

Robert O. Swain

Editor

Rural Traffic Counts

by JAMES S. BURCH, *Member ITE*

THOSE who handle large volumes of rural traffic count work may find the following North Carolina data for 1947 of interest and value. Since North Carolina is perhaps the largest State having jurisdiction over *all* rural roads, it is probable that the coverage and intensity of this work is as great as in any State in the Nation. Count stations are usually 5 to 10 miles apart, thus increasing the time and travel over that in urban coverage.

With eight field men working a total of 1731 man-workdays (excluding Saturdays), we made a total of 13,616 good 24-hour machine counts during the year, and also 330 8-hour manual classification counts.

The machine counts involved:

At 214 Control Stations, made 24-hour counts one day in each quarter	856
At 6,380 Coverage Stations, made 24-hour counts one day in each six months period	12,760
Total Counts	13,616

Each of the eight men is equipped with a light panel truck, 25 K-Hill Traffic Counters, one Streeter-Amet Recorder, and other supplies. Each man covers about 12 Counties (⅛th of the State) and works alone. The same man makes an 8-hour manual count each week, and also installs a recording counter at a Control Station for a period of about five or six days. Thus, in a typical week, one man made over 39.4 24-hour machine counts, one 8-hour manual count, and one 5-day recording machine count, as well as testing his machines, cleaning his truck, etc.

Little Supervision

The office posting and control is cared for by only one man, and supervision requires the part time of one man. The usual weekly procedure for one field man, who lives near the center of his area, is as follows:

Monday—Install 20-22 machines

Tuesday—Remove same; and remove and install Recorder

Wednesday — Make 8-hour manual count

Thursday—Install 20-22 machines

Friday—Remove same

Saturday—Test machines, clean truck, etc.

Costs Data Given

The costs and unit costs for this field work in 1947 were as follows:

	8 Field Men	Unit Cost †
Salary	$16,845	$1.10
Subsistence	3,533	0.23
Mileage	8,993	0.59
Supplies	2,440	0.16
Postage	115	0.01
Total Field Cost	$31,925	$2.08

† Based on the 1947 performance record, one Manual Count considered to cost the same as 7.87 24-hour Machine Counts.
Thus, cost is divided by 13,616 actual 24-hour counts, plus 13,616/7.87, or 1,730 equals 15,345 equivalent 24-hour counts for Unit Cost purposes.
This represents 15,345 "work units", each unit being equal to the cost effort of making one 24-hour machine count.
Charges include weekly removal and installation of one Recorder.

NEW JERSEY'S DUAL-DUAL CARRIES HEAVY LOAD

A section of New Jersey's **dual-dual** highway on U. S. 1 near the Newark Airport is pictured above. Five minute counts of south bound traffic expanded to between 1932 and 2616 vehicles per hour on September 12, 1947 according to Charles Prisk of the Public Roads Administration.

Courtesy Public Roads Administration

TRANSPORTATION CONGRESS

Washington, D. C., host to the highly successful First Highway Transportation Congress two years ago, has been selected as the city for the Second Highway Transportation Congress to be held in May under auspices of the National Highway Users Conference.

The dates of May 6 and 7 have been selected for the Congress, the Conference's Director, Arthur C. Butler, has announced.

Representatives of many of the 1,000 national and state highway user groups affiliated with the National Highway Users Conference will attend the Congress, as will officials and leaders in the automobile, petroleum, rubber and other industries. Alfred P. Sloan, Jr., chairman of the National Highway Users Conference, is scheduled to open the Congress.

Truck Loading Zones

by DAVID R. LEVIN, *Public Roads Administration*

THE truck has grown from an industrial and agricultural upstart to one of the dominant factors in our national economy. It performs a fast, flexible and economical service from any origin to any destination desired. Approximately six and a half million trucks are moving an unprecedented tonnage of goods and produce today. On rural roads, freight movement by truck that has either its origin or its destination in a city now exceeds 63 billion ton-miles, an all-time high. Additionally, trucks carry practically all goods moved in wholesale and retail delivery in urbanized areas.

Truck terminal facilities may consist of centrally-located, multi-million dollar structures as are being planned and constructed by the Port of New York Authority in the New York-New Jersey metropolitan area; or they may be individual or multiple, enclosed or unenclosed, loading and unloading berths or platforms, located adjacent to or in the vicinity of specific commercial, industrial or other establishments. This paper is an analysis of only the latter type of truck terminal facility as required by zoning ordinances, building codes, or other local ordinances in connection with specific uses.

As of December 1, 1947, there were in the United States at least 66 local governmental units in 28 States that had zoning or other ordinances requiring the provision of off-street truck loading and unloading facilities in connection with various property uses.* Of this total, 53 were cities; 4, towns; 4, villages; and 5, counties. Approximately two-thirds of these localities have populations of 50,000 or less. Thirteen communities have over 100,000 persons, while four contain over 1,000,000.

Administration

In most instances, the local legislative body retains primary regulatory authority over the provision of off-street truck loading facilities through the zoning process. Of the 66 local units that have such ordinances, the city or common council, with or without the assistance of the mayor, is designated as the regulatory agency in 30 cities. The board of city commissioners, with or without the mayor, is specified in 9 other cities. A great variety of other local public bodies or officials is vested with such authority in the remaining 27 places, including the zoning commissioners, the city planning commission, county commissioners of roads and revenues, and others.

In keeping with the observed trend in local legislation, it would seem desirable for the local law-making body to retain primary regulatory control with respect to the mandatory provision of off-street truck loading and unloading facilities. However, it might be appropriate for the local legislature to delegate some of its regulatory functions to a competent public parking agency, if such exists, so that the provision of off-street parking and truck loading facilities, in all their various forms, might be appropriately integrated.

Use Advisory Groups

Frequently, advisory agencies are

* Statistics contained in this report are based on research covering hundreds of zoning ordinances. It was not practical, however, to canvass all possible local units which may have similar loading and unloading requirements, and there are doubtless many more than the 66 units known to have such requirements at the present time.

designated for the purpose of investigating and making reports and recommendations to the local legislative body in connection with any proposed change in the zoning ordinance. In 37 of the 66 ordinances contained in this analysis, the planning commission or board is designated as the advisory body. In other instances, the zoning commission, the board of adjustment, the board of zoning appeals, or the planning and zoning commission are so indicated.

Because local planning bodies are generally intimately associated with zoning objectives and are concerned with the over-all development of the urban community, they should be accorded the undisputed right to serve in an advisory capacity on matters relating to the provision of off-street truck loading and unloading facilities by means of zoning.

Provide Enforcement

In addition to regulatory and advisory bodies, machinery for enforcement is almost invariably provided. In 27 instances, the building inspector is named as the enforcement official. In 6 cities, it is the commissioner or superintendent of buildings; in 3 cities, the city manager; and in two cities, the zoning administrator. In the remaining instances, the enforcement officer has been designated to be the city engineer, an official designated by the mayor, the department of building and safety engineering, the commissioner of public utilities, grounds and buildings, the street and sewer department, and a variety of others. It seems quite obvious that the local building inspector or the department where that function is lodged is probably best equipped to enforce zoning requirements.

Facilities Required

Fourteen different places in 9 States require truck loading facilities in connection with hotels, institutional buildings, hospitals and mortuaries. In commercial and manufacturing districts in Arlington County, Virginia, for example, truck loading space not less than 15 feet in width for every 50 feet of building width, nor less than 25 feet in length and 15 feet in height is required for these uses. In Detroit and Highland Park, Michigan, on the other hand, one space is required by law for every 20,000 square feet in excess of 3,000 square feet of building floor-use or land-use for hotel, hospital or mortuary purposes.

The European Recovery Program, commonly termed the "Marshall Plan" takes cognizance of the highway transport situation by advocating greater use of commercial motor vehicles in Europe. Proposals included in the plan call for the increase of truck fleets of the participating countries over their prewar fleet.

Ten cities in 6 States have ordinances containing provisions relating to retail or wholesale stores or markets, warehouses, supply or display houses, loft buildings, laundry or dry cleaning establishments. Perhaps one of the best known is the New York City provision requiring one space for each 25,000 square feet and fraction thereof in excess of 5,000 square feet of aggregate gross floor area designed or used for storage, goods display or department store purposes. An ordinance in Rochester, Minnesota, requires that in commercial districts, a plant for pasteurization, bottling, or distribution of milk must be provided with adequate facilities for loading and unloading within the structure housing the plant.

Required in 28 States

Fifty-four local units in 26 States require loading and unloading facilities in connection with what is termed business and commercial or personal

service establishments. Seven of these apply to local business districts only, and consist of rear yards, of prescribed size, while 6 places make a similar requirement in both local and general business districts. Thirty units require such facilities either in business or industrial districts, or in both, while 11 require the provision in any district.

Industrial and manufacturing establishments are required to make provision for truck loading and unloading by 41 local units in 22 States. The requirement is restricted to manufacturing or industrial districts in 9 places, and to business or industrial districts in 20 places, while 12 ordinances specify that they shall be provided in any district.

Physical Features

Only 8 of the 66 ordinances contained in this analysis designate the size of the off-street loading and unloading berth in precise terms. Three indicate the dimensions to be 10 feet by 25 feet, with a 14-foot height clearance. Two specify 200 square feet of area, with minimum clear height of the area and its approaches of 14 feet. Another provides that a space shall be 10 feet in width, 20 feet in length measured perpendicularly to the alley and 14 feet in height. Twenty-five feet by 10 feet, with a minimum clear height of the berth and its approaches of 12 feet, is still another specification. Finally, a single ordinance requires a space not less than 10 feet in width and 30 feet in length.

The adequacy of a prescribed size of loading berth is a function of a number of variables that include (1) the size of the vehicle which will use the space, (2) the nature of the property use to which the loading facility is accessory, (3) the design and character of the access. Since motor transports are being designed for greater and greater capacities,

An outright gift worth $1,500,000 has been offered to the city of Fresno, California in the form of a 753-car underground garage to be built almost entirely under one of the city's principal thoroughfares.

The plan, presented by a group of private citizens who already have donated nearly $10,000 for preliminary work, calls for construction of a two-level garage, complete with all services for motorists, on the pattern of San Francisco's highly successful Union Square Garage.

With city commission approval virtually assured, plans are being made for construction in a six-month period, but almost a year would be required to complete engineering details and prepare cost estimates.

truck loading space that has been provided in the past has a tendency to become more and more inadequate. Reasonableness, in light of all the circumstances, should prevail.

Non-conforming Uses

A matter that has vexed students of the problem for some time is the retroactive application of ordinance requirements for the provision of off-street truck loading and unloading facilities and the ultimate liquidation of non-conforming uses. Unfortunately, existing non-conforming facilities cannot be eliminated in the same manner that a tough commanding general issues an order of the day. What the courts ultimately will do when confronted with the issue on the merits is something for the judicious to ponder. Suffice it here to suggest that thus far at least, there has been nothing encouraging to proponents of retroactivity in existing legislative trends, and little more in judicial acceptance.

Existing ordinances requiring the provision of designated off-street truck

loading and unloading facilities apply uniformly to all new structures and uses, unless specifically exempt. Additionally, a non-conforming use (with respect to truck loading facilities) may be terminated upon the occurrence of certain events. The provision for Detroit, Michigan, is typical: A non-conforming use shall be discontinued if the building is physically changed, except as may be required or as was originally planned, or if building is reconstructed following damage at an expense exceeding 60 per cent of the assessed value at the time of such damage. If the non-conforming use is abandoned or discontinued for a period of two years or if it is changed to a conforming use, the building or land may not again be used for a non-conforming use. In most instances, the period of non-use is limited to one year rather than two years, as found in the Detroit ordinance.

A rather belabored attempt at the gradual elimination of non-conforming uses, at least with respect to residential zones, is found in the zoning ordinance for Los Angeles: In "R" residential zones, a building or structure designed, arranged, or intended for a use not permitted therein is to be completely removed or converted so as to be conforming at the following ages, computed from the date of erection. Buildings defined in Los Angeles City Building Code as Classes I and II, 40 years; Classes III and IV, 30 years; and Class V, 20 years. This regulation is not to become operative until 20 years from the effective date of article. It is apparent that this provision has little application, if any, to the adequate provision of truck loading facilities, as the zones involved are residential in character.

The provision of off-street truck loading facilities through the zoning mechanism is a positive, rather than a negative approach to betterment of urban community. For it stimulates the local citizenry to do what is *right* in the *right* place, rather than *restraining* them from doing the *wrong* thing in the *wrong* place. Truckers, shippers, consignees, commercial and industrial interests will all be benefited by the adequate provision of off-street truck loading facilities. Transportation costs will be lower, congestion will be alleviated. Property to which loading and unloading facilities are adjunct, will be rendered more accessible thereby and accordingly will become more valuable.

For these many reasons, then, it is desirable for every urban community that has not already done so to amend its zoning code so as to require the reasonable provision of off-street truck loading and unloading facilities in accordance with the indicated needs of the respective property uses.

Government officials believe that while gasoline supplies this summer will equal those of a corresponding period in 1947, the increase in motor vehicle travel (approximately six per cent) will result in a shortage.

ROAD WORK INCREASING

Highway construction in the United States during 1948 is expected to double 1946's total.

Federal, state and local governments are due to spend one and a half billion dollars this year, according to the Federal Works Agency, a total that compares with an estimated $1,200,000,000 in 1947, and $706 million in 1946.

Indicating the economic importance of this phase of highway transportation is the fact that the 1948 estimate constitutes 40 per cent of the total public construction anticipated this year.

Reducing Night Accidents

by Otto P. Ortlieb, *Member ITE*

For a number of years the street lighting officials of the City of Trenton, New Jersey, had been aware that the night traffic accident situation required improved illumination. Studies of day vs. night accidents showed conclusively that poor visibility was a major factor at night. No improvement could be made during the war years, but in 1946 City Commissioner George W. Rieker sponsored a program to increase the lighting along the main streets and secured the approval of the Board of City Commissioners. This article presents the accident record in Trenton which convinced the City authorities that better illumination was vitally necessary.

One of the most significant compilations was that showing an analysis of the traffic fatalities by class of street and light condition (see Table 1). This indicates that the night hazard was most pronounced on the 21.9 miles of principal thoroughfares. On these streets the night fatalities were 71 per cent of the total day and night deaths while on the very light traffic streets the night fatalities were only 39 per cent of the total. Also, the right-hand column of the table shows 2.2 night deaths per mile on the principal thoroughfares and only 0.1 night deaths per mile on the very light traffic streets. The central business streets and the secondary thoroughfares also had a very poor record at night and it was readily evident that the improved lighting should be concentrated on the main streets in order to reduce the number of deaths at night.

A further analysis of the fatalities along the main streets for the ten

Table 1

PERSONS KILLED IN TRAFFIC ACCIDENTS IN TRENTON

10 YEARS — 1937-1946 (Incl.)

	Day	Night	Total	Per Cent at Night	Miles of Streets	Night Fatalities Per Mile
Central Business Streets	5	5	10	50%	4.8	1.0
Principal Thoroughfares	20	49	69	71	21.9	2.2
Secondary Thoroughfares	7	15	22	68	27.2	0.6
Total Main Streets	32	69	101	68	53.9	1.3
Very Light Traffic Streets	14	9	23	39	96.5	0.1
Total of All Streets	46	78	124	63	150.4	0.5

(In this article the term "Principal Thoroughfares" refers to streets classed as "Medium Traffic" by the ITE Street and Highway Lighting Committee and have from 500 to 1200 vehicles per hour during the maximum night hour. "Secondary Thoroughfares" refer to the ITE "Light Traffic" streets with 150 to 500 vehicles per hour. The "Central Business" streets are mostly in the Medium Traffic class.)

year period appears in Table 2. This shows that the pedestrians were the ones who suffered the largest number of deaths along the main streets, both by day and by night. Child deaths all occurred during daylight hours, primarily because the young children are generally brought indoors after dark. The adult pedestrians had a very poor record at night with 53 deaths during darkness compared with 16 deaths in the daytime. The pedestrians killed at night were generally well along in years, 60 per cent of them were over 60 years of age. These older persons usually wear dark clothing, they walk rather slowly and they are not as alert to traffic dangers as younger people. They apparently did not note the approaching vehicles and it was evident from the detailed police reports that the drivers either did not see the pedestrians or they saw them just before the accident happened. Good street illumination should help greatly in reducing the number of these pedestrian deaths.

Traffic counts made on the Trenton streets indicated that approximately two-thirds of the traffic moved during daylight hours and one-third at night. When the hours of darkness, with one-third of the total traffic, have 68 per cent of the deaths on the main streets, it is clear that this condition should be studied and action taken to secure improvement.

Urge Lighting

This subject was thoroughly investigated by the Citizens' Advisory Board on Safety and Traffic and this Board urged that an immediate start be made on lighting increases. A review of the accident facts and reports from police officials on fatal accidents convinced the Board that the lack of good visibility was the most important element in the night deaths, particularly in the cases of the pedestrians run down at night. The recommendation of this group of representative citizens interested in safety was of great importance in expediting approval of this program by the Board of City Commissioners.

In addition to the data on fatal accidents, studies have also been made of the injury and property damage accidents by day and by night on the various classes of streets. These data for the past four years are in Table 3. These figures show that along the principal thoroughfares 51 per cent of the accidents happened at night. A substantial variation is evident in the night accident experience on the various classes of streets and the trend generally agrees with the results shown for fatal accidents in Table 1, with the busier streets having a higher percentage of night accidents than the less important streets.

During this four year period the central business streets had 20.2 night

TABLE 2

FATALITIES ON MAIN STREETS — 1937-1946

		Day	Night	Total
Pedestrian	Child	8	0	8
	Adult	16	53	69
	Total	24	53	77
2 Motor Vehicles		3	5	8
Other Types		5	11	16
Total All Fatalities		32	69	101

accidents per mile per year, the principal thoroughfares had 11.6, the secondary thoroughfares had 3.5, and the very light traffic streets had only 0.6 night accidents per mile per year.

Priority Established

Based on these several facts it was decided that the central business streets and the principal thoroughfares should be given priority in the lighting program. These streets have a large number of night accidents per mile of street and the night accidents constitute an unduly large proportion of the 24 hour total. The first lighting improvements have, therefore, been made on these streets.

It is interesting to see in Table 4 the different types of accidents which have occurred during the past four years on the 53.9 miles of main streets. Slightly more than one-half of all persons injured have been pedestrians and it can be seen that darkness greatly increases the pedestrian hazards. The record for adult pedestrians shows that 61 per cent of the accidents occur at night. The children have a much better night record but this is no doubt influenced by the fact that the young children are generally not permitted to play on the streets after dark. Conse-

TABLE 3
TRAFFIC ACCIDENT DATA BY CLASS OF STREET
FOUR YEAR TOTAL — 1943, 1944, 1945, 1946

	Day Accidents				Night Accidents				
	F.	Inj.	P.D.	Total	F.	Inj.	P.D.	Total	Per cent at night
Central Business Streets	1	118	346	465	3	88	296	387	45
Principal Thoroughfares	6	298	674	978	14*	312	690	1016	51
Secondary Thoroughfares	4	150	352	506	5	100	271	376	43
Total Main Streets	11	566	1372	1949	22*	500	1257	1779	48
Very Light Traffic Streets	5	163	252	420	2	66	182	250	37
Total of All Streets	16	729	1624	2369	24*	566	1439	2029	46

*2 Deaths in one fatal accident, 25 night deaths in four years.

TABLE 4
ANALYSIS OF ACCIDENTS ON MAIN STREETS
FOUR YEAR TOTAL — 1943, 1944, 1945, 1946

	Day Accidents				Night Accidents				
	F.	Inj.	P.D.	Total	F.	Inj.	P.D.	Total	Per cent at Night
Mot. veh.—Child pedestrian	4	191	—	195	—	44	—	44	18
Mot. veh.—Adult pedestrian	5	134	—	139	19	197	—	216	61
Mot. veh.—Pedestrian, total	9	325		334	19	241	—	260	44
Right angle collisions	2	85	417	504	—	74	292	366	42
Opposite direction collisions	—	29	119	148	1	54	228	283	66
Rear end collisions	—	29	176	205	—	23	88	111	35
Start from parked position	—	2	148	150	—	2	50	52	26
Other same direction collision	—	6	122	128	—	9	105	114	47
Other 2 moving mot. veh. col.	—	7	88	95	—	6	53	59	38
Motor vehicle—Parked car	—	14	226	240	—	39	335	374	61
Motor vehicle—Bicycle	—	35	5	40	—	7	5	12	23
Mot. veh.—Fix. obj. & misc.	—	34	71	105	2*	45	101	148	58
Total Accidents	11	566	1372	1949	22*	500	1257	1779	48

*2 Deaths in one fatal accident, 23 night deaths in four years.

quently, the exposure of these children at night is much reduced.

The data for accidents involving a parked car show that 61 per cent of these mishaps occurred at night. The accidents of a motor vehicle striking a fixed object and miscellaneous types are also mostly at night, the figure being 58 per cent. Considerable variation is evident in the various kinds of accidents. No doubt some types have a low percentage of night crashes because of lower exposure. Probably there are relatively fewer vehicles starting from a parked position at night than during daylight, thus resulting in a comparatively good night record. It is likely that bicycle accidents are influenced by a relatively large use of the bicycles during daylight hours. Future experience with good lighting will show which types of accidents can be reduced by adequate visibility at night.

The City of Trenton is now engaged in a program of increasing the lighting of the 53.9 miles of main streets up to the intensities recommended by the Illuminating Engineering Society and which have recently been approved by the American Standards Association. Considerable progress was made in 1947 on the principal thoroughfares and 1,994,000 lumens were added to the lighting system, practically all by the use of larger lamps in existing luminaires. Due to the fact that most of the 1947 increases in lighting were made near the end of the year, it is unlikely that significant reductions in night accidents will be shown for that year.

Long Range Program

The program will require two or three more years to complete and will include the installation of additional lamps, increases in lamp sizes and the use of more efficient luminaires. All work will be done by the Public Service Electric and Gas Company which owns and operates the system.

Studies have been made of the possibility of securing better light distribution from the luminaires in order to reduce glare in the motorists' eyes and also to reduce the light toward the housefronts along the street. Since the glare from street lamps lowers the ability to see, it is important that this be reduced whenever possible. Some improvement has been made along one thoroughfare by raising the lamp filament in the luminaire to produce the maximum beam at 70 degrees from the vertical instead of the usual 75 degree maximum. With the closer lamp spacings which will be required to produce the adequate lighting intensities, there is less need to spread the light so far up and down the street.

Street lighting officials, police officers and safety-minded citizens in Trenton all believe that this program of adequate illumination will save lives and reduce accident losses at night and further believe that the direct savings to the citizens of Trenton will be greater than the increased cost of the lighting. Numerous other cities have found that good lighting has more than paid for itself and the future night accident record in Trenton is awaited with confidence.

INCREASE REVENUES

The Port of New York Authority reports that bridge and tunnel traffic in 1947 totaled 44,478,050 vehicles, an all-time high. This traffic exceeded the previous peak of 1946 by 7.9 per cent when 41,202,474 vehicles used the Port Authority facilities.

Toll revenues for the year amounted to $25,312,928 as compared with $23,434,964 in 1946, an increase of 8 per cent.

Ice Prevention on Highways

by LeRoy F. Johnson

The desire to have pavements free of ice or frozen compact snow during winter months is shared both by those who maintain the highways as well as by those who must use them.

Believing this could be accomplished, we began to experiment in February, 1941, with both calcium and sodium chlorides, separately, and combined in various proportions. From the results of these experiments, our present method was fashioned.

It is now our practice, on a two-lane road, to spread CC grade sodium chloride for a width of about two feet along the center of the pavement This is spread either as soon as one inch of snow has fallen, provided it compacts under traffic, or immediately after the snow plowing has been completed. The sodium chloride is applied at the rate of approximately ¼ pound per square yard on the two-foot strip. Because it is spread without positive checks, the quantity will vary between 300 and 400 pounds per mile.

Type of Snow

With the practice of spreading the chloride at the beginning of a snow storm, those in charge of this work must first know if the snow is compacting under traffic. If it does not, and traffic tends to blow it from the pavement, no chloride is spread because chloride under this condition would make the snow adhere to the pavement. If it does compact then the chloride is spread.

Spreading chloride at the beginning of the storm breaks up the compact snow into a mealy condition which permits the plows to remove most of it from the pavement. This practice is not especially effective on roads carrying only a small volume of traffic since the chloride becomes buried by the snow and consequently is ineffective. If the storm is of sufficient duration to dissolve all the chloride, additional applications should be made, and usually at the end of the storm there are some short sections of pavement which require additional treatment.

This method is particularly adaptable on streets and highways carrying large volumes of traffic.

Used at Once

When sodium chloride is used following the storm, it is vitally necessary that it be spread as soon as the storm is over and the pavement has been plowed; provided the snow has compacted under traffic. It has been our observation that at the conclusion of these storms the temperature remains above 20 Deg. F. for a short time. This period is generally of sufficient length to permit traffic to break up the snow mat and move it off the pavement.

With freezing rains, the sodium chloride is spread as soon as ice appears on the pavement. Generally one application of 300 to 400 pounds per mile will suffice to dissolve existing ice and provide a bare pavement when the storm has passed. This practice will permit emergency use of the highways by motorists traveling at reasonable speeds during these storms with some degree of safety. Prior to our use of direct application of sodium chloride, it was practically impossible to keep motor traffic moving during, and for some time after, the storm was over.

Rain Interferes

Occasionally the temperature will fluctuate above and below freezing during one of these storms, and generally when the temperature rises above the freezing point, rain will fall more rapidly—thereby dissolving the chloride and making it necessary to repeat the application when the temperature drops below the freezing point and ice again begins to form.

Although we believe we have had remarkable success with this method, there is one type of storm with which we have experienced difficulty. That is the storm when both sleet and rain fall together and deposit an inch or more of sleet on the pavement. Chloride spread at the beginning of these storms either becomes completely dissolved, or covered, so that no air can reach it and consequently becomes ineffective. The temperature drop to much below freezing soon after the storm is over does not provide sufficient time to permit the pavement to be plowed and an ice sheet results. When this condition exists, we spread an application of calcium chloride followed by one of sodium chloride—the calcium chloride at the rate of 200 pounds per mile—the sodium chloride as previously described. This will generally cut through the ice layer and begin clearing the pavement.

Snow Compacts

Frequently we experience a storm during which the temperature will be above 30 Deg. F., when 12 to 18 inches of snow may fall. At these temperatures, the snow compacts under motor traffic and the plows cannot clear the pavement. Following this type of storm there generally is a gradual temperature drop to 0 Deg. and lower—these low temperatures sometimes continuing for two or more weeks with only occasional temperature rises when another snow storm arrives.

1947 TRAFFIC TOLL

Killed—100,000.
Injured—10,500,000.
The cost—$6,700,000,000.

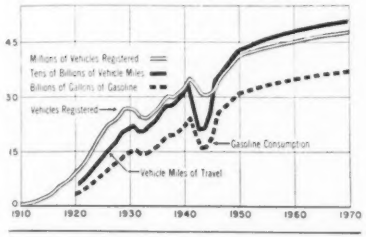
It was not unusual in the past to spread abrasives continuously for two or three weeks after this storm because it left a mat of snow on the pavement which became compacted and frozen. The snow storms which followed it came with much lower temperatures, and instead of being large moist flakes, were hard pellets which traffic would dust off the snow surface after the road was plowed.

Now, one of these snow storms, with an accompanying temperature in the thirties, is generally cleared with one application since the chloride quickly penetrates the snow mat at these temperatures, and with the aid of traffic soon clears the pavement.

Sand is Used

Before we used direct applications of sodium chloride it was our practice to spread abrasives the entire length of the road along the center of the pavements. With this method of winter maintenance, approximately 175,000 cubic yards of sand were used on 2800 miles of highways each winter. Frequently, before these roads could be resanded, many areas would become slippery because of the rapid movement of the abrasives from the pavement on curves and grades by passing vehicles. We now normally use about 40,000 cubic yards of abrasives on 3000 miles during a winter, largely to provide traction on grades before the pavements become bare, and during and after sleet storms. Our inability to obtain sufficient chloride, because of the lack of railroad shipping facilities last winter, resulted in our being required

Vehicle Miles Expected to Exceed Pre-War Peak By 50% in 20 Years



from Paul G. Hoffman's Beecroft Memorial Lecture

NEW APPOINTMENT

The appointment of Marland K. Strasser to the staff of the National Conservation Bureau, accident prevention division of the Association of Casualty and Surety Companies, has been announced by J. Dewey Dorsett, Association general manager. Mr. Strasser is assigned to the safety education service of the Bureau and will devote most of his time in the field of high school driver education and training.

to use about 25,000 additional cubic yards.

Our highways vary in elevation from just above sea level to 2000 feet. With this method we have been successful in providing a bare surface for at least an eight-foot width along the center of the pavement in the areas of high elevations with low volumes of traffic, and entire widths in areas of lower elevations with medium to high volumes of traffic, throughout the winter months.

ROAD IMPROVEMENTS INCREASED IN 1947

Improvement of the Nation's highways proceeded at a faster pace in 1947 than in the previous year, according to reports received from State highway departments by the Public Roads Administration of the Federal Works Agency.

Reviewing the progress of the highway program, Public Roads Commissioner Thomas H. MacDonald said contract awards authorized by the States during the year called for $895,000,000 worth of work on 44,700 miles of road. This was approximately $150,000,000 more than the cost of road construction contracted for in 1946.

The 1947 total included contracts for Federal-aid projects to cost $640,000,000 and 19,800 miles in length.

State Work Up

Expenditures for State-administered highway work under way during the year amounted to approximately $890,000,000.

At the year's end, Commissioner MacDonald said, Federal-aid projects costing more than $700,000,000 were under construction, and plans had been approved for additional projects costing around $350,000,000, on which work is expected to start this year. The total estimated cost of Federal-aid projects programmed by the States for construction but not yet advanced beyond the planning stage was nearing $750,000,000.

The urgent need for better highways throughout the Nation was emphasized by steadily mounting floods of traffic on main rural roads and urban thoroughfares.

Registrations Up

Motor vehicle registrations in 1947 are estimated to have exceeded 37,000,000, setting an all-time record.

This was approximately 3,200,000 more than the 1946 total and 2,644,000 above the number of motor vehicles registered in 1941, the previous peak year.

Travel on rural highways during the year was estimated at 187 billion vehicle-miles, an increase of approximately 10 per cent over the volume of rural travel in 1941.

The increasing use of highways for commercial transportation was reflected in the fact that truck registrations rose from 4,859,244 in 1941 to an estimated total of 6,500,000 in 1947, an increase of around 33.7 per cent. The increase over the 1946 total of 5,725,692 registrations was approximately 13.5 per cent.

More Trucks Used

Truck-hauling on rural roads during the past year was estimated at 86 billion ton-miles, as compared with a total of 73.5 billion ton-miles in 1946.

With traffic congestion steadily becoming more serious, one of the most important developments in 1947 from the standpoint of the average motorist was the designation of a 40,000-mile interstate system of highways which eventually will be improved to high standards, Commissioner MacDonald said. The system includes routes carrying large volumes of traffic into and through cities.

Commendable progress was made by the States, in cooperation with municipal authorities, in the planning and actual start of construction on expressways designed to speed the flow of traffic in urban areas and at the same time reduce accident hazards, Commissioner MacDonald added.

Commenting on contract price trends, Commissioner MacDonald noted that construction costs for various classes of road work have risen 80 to 93 per cent above 1940 costs.

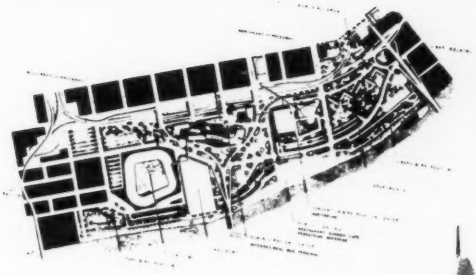
Work was begun during the year on urban expressways and multi-lane rural highways in Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, the District of Columbia, Florida, Ohio, Texas and California. In other States plans for expressway projects were well advanced, and initial contracts are expected to be let in the near future.

ACCIDENT RECORDS MANUAL PUBLISHED

A manual on the uses of traffic accident records has been published by the National Conference on Uniform Traffic Accident Statistics.

This Manual is the work of the Committee on Uses of Developed Information of the National Conference on Uniform Traffic Accident Statistics. When the Committee was created in March 1941, it was recognized that accident information was becoming increasingly available in greater completeness and detail in most cities and states, but that too few uses were being made of this reported information. Accordingly, the Committee undertook the preparation of a Manual which would encourage more extensive and uniform uses of accident records, and which would bridge the gap between the statistical systems employed in the collection and basic analysis of accident data and the uses of accident information. Needs of engineers, educators, enforcement officials, and other groups were taken into account.

The 53rd Annual Meeting of the International Municipal Signal Association will be held at Hotel Statler, Buffalo, N. Y. October 4-7, 1948.



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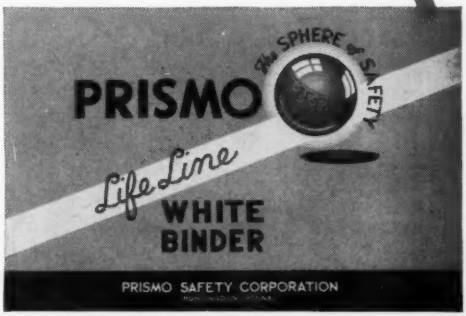


*Write for Bulletin 461 (Prismo Life Line), and for Bulletin 547 (Prismo Sign Kit).

LOUISVILLE AGREES ON PARKING METERS

Installation of downtown parking meters, creation of more off-street parking facilities, and heavier fines for parking violations were approved by a majority of 30 representatives of interested groups.

The meeting was called by the Louisville Area Development Association Parking Committee, headed by James W. Henning, to sound out opinion on a proposed ordinance to authorize meters.

Present were City officials and members of retail, trucking, transport, safety, automobile, and parking-lot associations.

Henning said his committee, composed of Louis J. Herrmann, W. R. McIntosh, and Robert P. Bonnie, will give its recommendations to the L.A.D.A. board of directors which, in turn, will make its suggestions to the Board of Aldermen. A parking-meter ordinance is expected to be introduced before the aldermen in the near future.

City Traffic Engineer W. F. Watkins told the group that the City Works Department, after a study of parking and the use of meters, had these proposals:

1. Meters should be installed where parking will not impede traffic flow.

2. A total of 1,077 meters should be installed.

3. All parking should be prohibited on both sides of Second, Third, Fourth, and Fifth, from Broadway to Main, and on both sides of Chestnut, Liberty, Walnut, and Main, from First to Seventh.

4. Parking spaces should be sold for one hour or less at a time. The time of operation probably would be from 7 A.M. to 6 P.M.

5. To replace the present parking fine of $1.00 and no-stopping fine of $3.00, fines should be $3.00 for violation of limited parking, $4.00 for no parking, and $5.00 for no stopping.

6. The entire revenue from parking meters should be used for the improvement of traffic conditions.

Before discussion began, Henning reviewed the history of parking-meter proposals here. In 1937, he said, an ordinance was passed to permit installation of meters. This was attacked by the Louisville Automobile Club. In 1944, the Board of Aldermen repealed the 1937 ordinance.

Two Objections Eliminated

Eugene Stuart, secretary of the Louisville Automobile Club, said the present proposal eliminated two objections that club members had to the old ordinance.

"That ordinance was strictly for the raising of revenue," he said, "and it did not guarantee that the revenue would be used to improve traffic."

He said the club's directors would meet Friday night and consider the new plan. After that, he said, a mail vote of membership probably would be taken on the question of meters. In 1944, the membership voted against meters, he said.

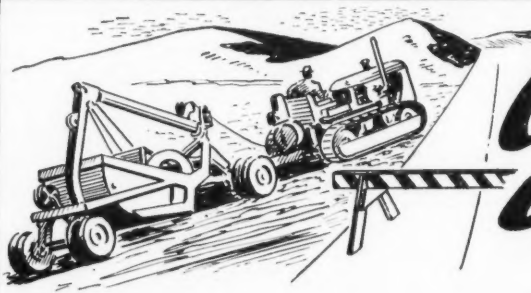
The meters cost approximately $75 each installed, K. P. Vinsel, L.A.D.A. director, said. The experience of other cities in Louisville's population bracket is that the meters pay for themselves within a year, he added.

Cost Would Be $75,000

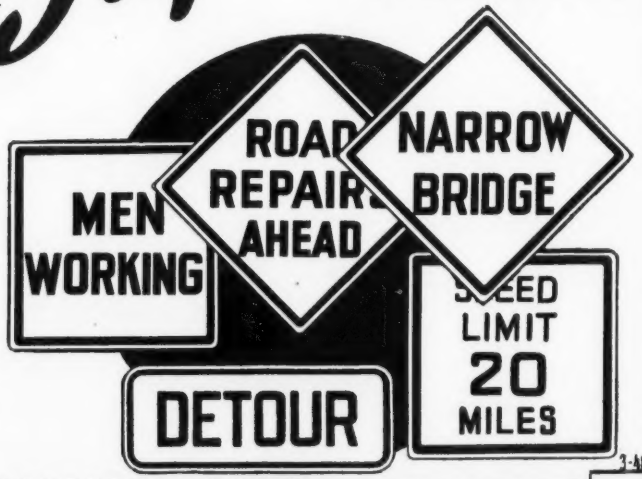
"To install 1,000 meters here would cost about $75,000," Vinsel said, "but in one year they should earn a gross income equal to that."

Estel Hack, director of the Louisville Safety Council, asked about the effect of meters on loading zones and taxicab stands.

(See LOUISVILLE, *page 270)*



Signs OF ACTIVITY



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(LOUISVILLE, *con't. from page 266*)

"Cities have handled that in three ways," Watkins said. "Space can be set aside for loading, it may be permitted in a metered zone or it may be permitted only at night time. We plan to let loading take place in metered zones. We think it will be easier to load and unload because meters provide a more rapid turnover of the curb space available."

Thomas A. Ballantine, president of the Louisville Taxicab & Transfer Company, said cab firms paid $66 a year for each 22 feet of curb space. Vinsel said this is a net figure and is equal to the $75 gross a parking meter would yield for the same space. Watkins and Ballantine agreed that cabstand space can be adjusted to the requirements of traffic flow.

Cleveland System Backed

H. C. Kelting, secretary of the City Truck Owners Association, said "deliveries in the business section must be made at all hours."

Kelting recommended the Cleveland system which leaves 200 feet in the center of business blocks for a loading zone. Watkins said that Cleveland officials had told him and City Engineer W. W. Sanders recently that this system was not working out very well.

"Loading is important," Watkins admitted, "but our streets have several major uses. These include traffic movement, parking, and the mass transportation of people. You can't go overboard in serving one element."

O. F. Hand, Louisville Parking Association president, questioned whether the meters would hurt traffic flow.

"The location of the meters will take care of that," Watkins replied. "There will be no meters on lanes needed for heavy traffic movement."

In discussing the use of revenues from meters, Watkins suggested that 60 per cent of the gross revenue, after the meters are paid for, be earmarked for acquiring off-street parking facilities. The other 40 per cent, he said, should be used for maintenance, collection, street marking, enforcement, and traffic improvement.

"We need every parking lot we have in Louisville," Watkins said. "But what assurance have we that they will remain parking lots? If a more valuable use occurs to the owner, the parking lot will disappear. If the City owns the lot, it remains at lot. I don't think the City should operate the lot but I do think it should own lots in order to keep them parking lots. This could be handled on the same basis, perhaps, that the County uses in renting the Armory to private enterprises."

It was agreed at the meeting that in spending the revenues, it would be better to have fixed costs taken care of with the remainder to go for the creation of off-street parking.

Traffic in the City of Portland, Oregon, has increased 27% since 1938, assuming the movement across the eight Willamette River bridges to be typical of the city-wide movement.

Ten years ago a total of 147,200 vehicles crossed these bridges in an average day. The total for a similar day in 1947 was 186,980. This also was an increase of 11% over the peak war year and an increase of 2.4% over the average day in 1946. The highest total was 50,872 vehicles over the Broadway Bridge, a four lane thoroughfare controlled at either end by traffic signals.

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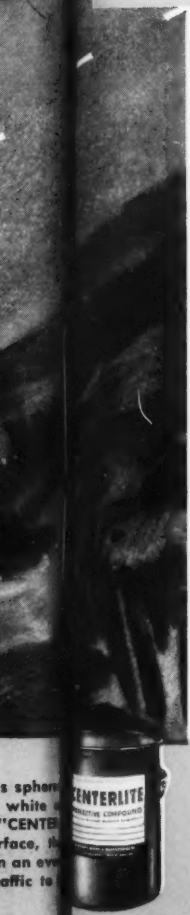

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REFERENCE NOTES

CITY PARKING LOT COSTS

Inquiries sent to a number of cities by the International City Managers Association brought reports from 30 cities showing the capacity and land and improvement cost per car or municipal parking lots as follows:

City and State	No. of Lots	Capacity Cars	Cost per Car
Albuquerque, New Mexico	1	250	$240
Anaheim, California	2	86	151
Benton Harbor, Michigan	6	815	61
Chambersburg, Pennsylvania	2	133	224
Fort Atkinson, Wisconsin	2	200	75
Freehold, New Jersey	2	400	65
Galesburg, Illinois	1	200	80
Greensburg, Pennsylvania	1	100	350
Hastings-on-Hudson, New York	1	150	1000
Independence, Kansas	1	40	225
Ithaca, New York	2	175	423
Johnstown, New York	2	170	106
Kalamazoo, Michigan	1	390	154
Kansas City, Kansas	6	686	451
Long Beach, New York	1	250	1
Madison, Wisconsin	2	150	327
Miami Beach, Florida	4	905	413
Millburn, New Jersey	2	175	256
Monroe, Michigan	5	270	167
Montclair, New Jersey	5	470	268
Mount Kisco, New York	1	100	200
North Adams, Massachusetts	1	140	429
Plymouth, Michigan	1	96	85
Port Huron, Michigan	3	550	93
St. Petersburg, Florida	1	500	45
Sioux Falls, S. Dakota	5	400	312
White Plains, New York	3	181	553
Whittier, California	8	210	260
Winnetka, Illinois	5	394	388
Woodbury, New Jersey	1	400	33

FREEWAY LIGHTING

"Adequate lighting along expressways is just as essential a safety factor as adequate sight distance, long radius curvature, wide lanes and road superelevation," in the opinion of Hugo H. Winter, Street and Parkway Design Engineer for Los Angeles. In a signed article in November American City, he compares the accident experience on the Arroyo Seco Parkway, a well lighted California freeway, with Riverside Drive, a comparable highway that has only "token" lighting. "The night accident rate (on Arroyo Seco) is only 12.5 percent greater than the daytime rate. On Riverside Drive the night accident rate is 75.5 per cent greater than the daytime rate."

CONTRIBUTE TO ACCIDENTS

Approximately 78 per cent of all traffic accidents after dark occur on unlighted streets, according to the analysis of 3,752 fatal accidents reported for 12 months by 15 states.

This analysis, made by the Street Safety Lighting Bureau, shows that 2,922 of the 3,752 fatal accidents were reported under the heading, "Darkness —street not lighted".

Applied nationally, this indicates that 18,000 of 1947's 35,000 traffic deaths occurred on streets without artificial lighting, according to the Bureau.

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ARMY PERSONNEL AT YALE BUREAU

The Yale University Bureau of Highway Traffic has enrolled fourteen Army officers and other transportation personnel from all over the country for its second course in Highway Traffic Engineering. The course covers one semester (16 weeks) of instruction and will be concluded on April 30, 1948.

The group this year is composed of two Lt. Colonels, three Majors, seven Captains, one First Lieutenant and one civilian. There are seven men from the Transportation Corps, five from the Air Forces and two from the Corps of Military Police.

According to Mr. Theodore M. Matson, Director of the Bureau of Highway Traffic, the curriculum of instruction includes courses in Highway Traffic Characteristics, Highway Traffic Regulations and Devices, Highway Traffic Administration, and Highway Traffic Design, as well as Practical Highway Traffic Problems.

"This one-semester's course of instruction was designed primarily to fit Army needs. Nevertheless, the entire course is based upon civilian experience and practice", said Mr. Matson. "While the regular course of instruction in Traffic Engineering offered by the Bureau of Highway Traffic ordinarily requires two full semesters of graduate work, the Army did not feel that it could release men from their assignments for that long a period."

Mr. Francis E. Twiss, Research Assistant of the Bureau of Highway Traffic is in charge of the course. He will be assisted by the other members of the staff and several outside speakers prominent in the Traffic Engineering profession.

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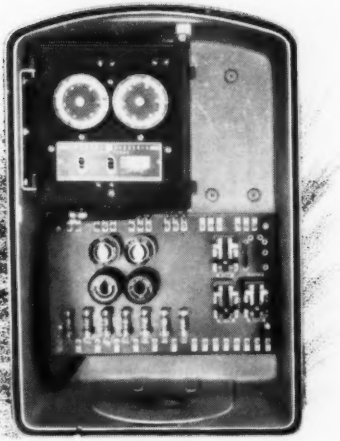
A New Traffic Controller



Two Cycle Lengths The new G-E Type DK controller has two independently driven dials. By having dials rotate at different speeds and by switching control from one dial to the other, cycle length can be changed. Lengths from 20 to 120 seconds can be selected for either dial.

Two Percentage Splits Percentage split for each dial is selected independently —in increments of 1 per cent. Thus main-street green can be lengthened for rush hours—and yellows can remain approximately the same regardless of total cycle length.

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Progression without interconnection Since both dials revolve at all times, it is perfectly practical to operate a number of these controllers from a common a-c supply, and synchronize both dials so that progression with either is achieved without interconnection. Manual synchronization switches are provided.

Triple offset For an interconnected system, this controller may be provided with automatic reset equipment, thus obtaining single offset with one dial and a choice of two offsets with the other. Thus, the system can provide ideal progression for northbound traffic during one period, for southbound during another, and with the optimum all-round progression during normal traffic periods.

Compact — Sturdy — Simple This DK controller is soundly designed. The improvements recently incorporated in the DH line are provided. All bearings are life-time lubricated. Every part has been designed with close attention to all details—to keep maintenance low, reliability high.

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G-E engineers will be glad to work with you in determining where this new controller will fit into your system. Address our nearest office or *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

453-39D

NEW DEVELOPMENTS IN TRAFFIC ENGINEERING

by CHARLES S. LECRAW, JR., *Associate Editor*

Traffic Control Plan, Houston

Since assuming his post as Director, Department of Traffic and Transportation, City of Houston, Tom Willier (Mem. ITE) has released a plan for the improvement of traffic conditions in the central business district of his city. The report is divided into three parts.

Part I discusses the present traffic control program as well as future plans for improving traffic conditions.

Part II refers to the need for conducting specific kinds of traffic and transportation surveys.

Part III proposes a one-way street system for the downtown district. Advantages of one-way traffic are listed and the approval of special interests is indicated.

The last portion of Part III is of great interest and might serve as a guide for other reports of a similar nature. Reproduced here are letters from various individuals and organizations endorsing the proposed traffic plan. Included in this group are: retail merchant associations, transit company, freight carriers' association, chamber of commerce, chief of police, and fire chief. Each of these letters approves the proposed plan; and such approvals—included as a part of the report recommending the plan—add weight to the plan itself.

Highway Safety Bibliography

The Highway Research Board has released an annotated bibliography on Highway Safety, prepared at the request of the National Committee for Traffic Safety. The classification of material follows the subjects of the President's Highway Safety Conference Committee Reports. Subjects included are: Laws and Ordinances, Accident Records, Education, Enforcement, Engineering, Motor Vehicle Administration, Public Information, Organized Public Support, and Reference List of Periodicals and Bibliographies. These headings are further subdivided in order to assist the user.

The bibliography has been compiled by the Committee on Highway Safety Bibliography. Light B. Yost (Asso. ITE) is chairman of the committee, which operates under the Traffic and Operations Department of the Research Board. Wilbur S. Smith (Vice-Pres. ITE) is chairman of the traffic department. M. Earl Campbell (Mem. ITE) represented the staff of the Highway Research Board on the committee.

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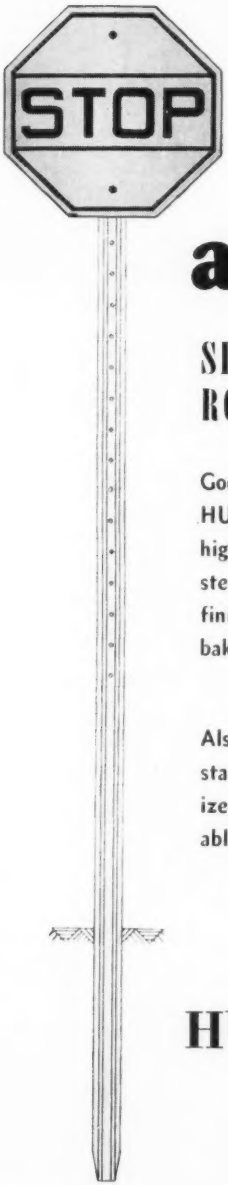

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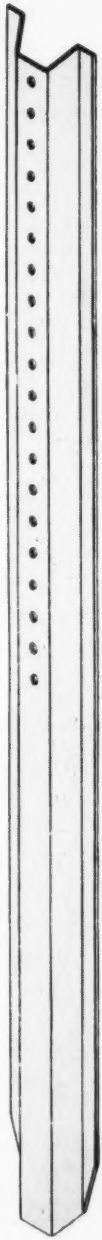

OPEN DISCUSSION

I have read with interest the report of the work of the International Association of Chiefs of Police and the Institute of Traffic Engineers in regard to the assignment of school crossing guards at hazardous intersections, as reported in the December, 1947, issue of Traffic Engineering.

It is noted that the article refers principally to the assignment of traffic officers for school crossing guard duty, offering a formula entitled "Warrants For Traffic Officers At School Intersections." While the normal method throughout the country of affording adult supervision to hazardous school crossings is to assign regular traffic officers to this duty, an entirely different method is followed in the City of Los Angeles.

It is our belief that the services of police officers are of too great value to warrant their being used as crossing guards. In order to provide protection at all times during which children are crossing a street en route to and from school, the traffic officer so assigned must devote the major part of his day to this duty, to provide morning, noon and afternoon supervision. In some of our schools which are operating on two or even three sessions, such supervision is almost continuous during the school day. Thus, a highly paid, well-trained police officer must devote almost all of his time to a task far below his capacities, depriving the city of his services along other lines.

Los Angeles therefore follows a program of hiring civilian crossing guards at $1.10 an hour, this being a regular Civil Service job. The qualifications for these guards are not exceedingly strict, the prime requisites being good vision, good hearing, alertness and a knowledge of the traffic laws. Housewives, pensioners and other persons not normally employed in the daytime are eligible. Crossing guards are supervised by a police sergeant, called the "Crossing Guard Coordinator," who supervises their work, instructs them in their duties and carries out all necessary liaison work with school officials.

The assignment of crossing guards is determined by the Crossing Guard Advisory Committee, consisting of two representatives of the Parent-Teachers' Association, the Traffic Engineer of the Board of Education, the Traffic Engineer of the Greater Los Angeles Safety Council, the City Traffic Engineer and the Deputy Chief of Police in charge of traffic or his representative. The decisions of the Advisory Committee are based in each case on preliminary studies conducted by the Bureau of Street and Traffic Engineering, including a sketch of the district, traffic counts of vehicular volumes and numbers of schoolchild crosisngs and a search of accidents occurring over the previous three years.

Actual assignment of guards is governed by a formula, probably the most liberal formula of its kind in the country. Under this formula, crossing guards are assigned if all of the following conditions are fulfilled:

1. If any school children are crossing the street during any five-minute period in which the volume of traffic exceeds 300 vehicles per hour.
2. If traffic signal, school tunnel or four-way boulevard stop sign protection is not available without an added 600 feet of walking distance to the nearest school gate.
3. If children cannot be reasonably directed over a route with existing protection or cannot be transferred to an adjacent school district.

Under the above formula, a total of 130 crossing guards are presently assigned to various locations throughout the city. As traffic signals may be installed at crossing guard locations, these guards are removed and assigned to new locations.

As may be noted by careful study, the Los Angeles crossing guard formula is based on the belief that if a single child is required by law to attend a school and must use a route which requires that child to cross a street on which the volume of traffic exceeds 300 vehicles per hour, that child is entitled to full protection. This policy does not exempt children attending parochial schools of any denomination. Cost, therefore, is not a direct consideration, although the total number of crossing guards which may be assigned is necessarily governed by the annual appropriation therefor. In this respect, the Los Angeles formula differs sharply from the formula advocated by the Institute, insofar as the prime requisite of that formula is the existence of a conflict ratio of 30,000 between the number of children crossing and the hourly volume of traffic. It is our belief that 25 children crossing a street with a volume of 600 vehicles per hour are in much greater total hazard than 300 school children crossing a street with a volume of 100 vehicles per hour. Under the formula of the Institute and the IACP, a crossing guard would not be warranted at the first such location but would be at the latter, while under the Los Angeles formula the reverse would be true.

Another major point of difference is the provision in the IACP-ITE formula that guards will not be assigned if adequate gaps in traffic can be afforded by traffic signals. It is the belief of the Los Angeles Advisory Committee that school children cannot be expected to have the mature judgment required to cross a street where a signal system is operating, except at a signal-controlled intersection. If it is necessary to cross at an uncontrolled point, a guard is assigned.

The question of assigning crossing guards and of setting up rules and prerequisites therefore is an open one, subject in large degree to local opinion and conditions. The Los Angeles method is described herein with the hope that it may receive constructive criticism, since it is our belief that study of this subject has never been properly developed throughout the nation as a whole.

R. T. Dorsey, Mem., I.T.E.
Principal Street Traffic Engineer,
City of Los Angeles

FLEET COURSE

Tulane University in New Orleans, La., conducted a five-day Fleet Supervisor Training Course opening February 2nd at the university stadium. Fleet owners and operators, safety and personnel directors, fleet supervisors and safety engineers, chief mechanics, transportation officials and others directly connected with safety and conservation in the motor transportation industry were eligible to enroll.

REFLECTO-LITE

TRADE MARK REG.

REFLECTING SIGN MATERIAL

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WARNS SOONER . . .
WARNS LONGER!

Reflectolite signs warn on the darkest night or in bright sunlight. It gives the vital safety impact of overall reflectorization, so that the shape and color of each type of marker can be recognized even before the legend can be read. Investigation will prove the merit of Reflectolite for your sign shops.

WRITE NOW—Samples and full information are available upon request. Write to the address below *NOW!*

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BLAME LOW SALARIES

A bulletin entitled "Salaries and Wage Practices of State Highway Departments", summarizing joint findings of committees representing the American Association of State Highway Officials and the Highway Research Board, suggests that the delay in the highway program is due in part to a shortage of engineering personnel, occasioned to a large extent by inability of the highway departments to pay adequate salaries.

In the 48 states 9,800 unfilled engineering positions were reported. The median professional salary paid by highway departments to engineers is $3,350 a year; the median subprofessional salary is $3,050.

FEDERAL AID BILL

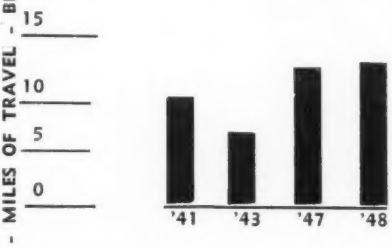
A bill to extend the 1944 Federal-Aid Highway Act without amendment through the next four fiscal years ending July 1, 1953, was introduced to the second session of the 80th Congress by Congressman Paul Cunningham, of Iowa, Chairman of the House Sub-Committee on Roads.

At the same time Congressman Cunningham submitted a companion measure (H.R. 4867) proposing indefinite extension of the current program, explaining that he personally would prefer that type of legislation, but that he did not believe it could receive approval.

TRAFFIC INSTITUTE GRADUATES

Twenty-nine men from 12 states, the U. S. Army, the Canal Zone, and China were graduated from the Northwestern University Traffic Institute's 17th traffic police administration in January. This brings to a total of 390 the number of men who have completed this course since it was started in 1936.

TRAFFIC TRENDS



TRAVEL ON RURAL ROADS FOR THE FIRST MONTH OF 1941, 1943, 1947 AND 1948.

[Based on Public Roads Administration Data]

ON THE SHELF

Highway Research Board.

A selected bibliography on highway safety. (Annotated). Bibliography no. 2. The Board, 1947. 46p.

Highway Research Board. Project Committee on Parking.

Report of project committee on parking. Reprinted from the proceedings of the twenty-sixth annual meeting of the Highway Research Board, December, 1946. Highway Research Board, 1946. p.442-445.

Iowa. State Highway Commission. Safety and Traffic Department.

Traffic accidents on primary road systems. A preliminary report to show relationship between accidents and traffic volume. The Commission, 1947. Unpaged.

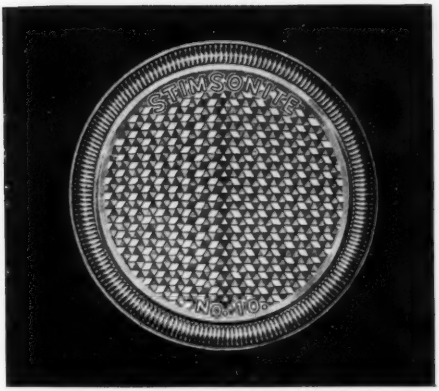
Louisiana. Alexandria.

Street and highway plan of Alexandria, Louisiana. Prepared for the State of Louisiana, department of highways. H. W. Lochner & Company, Chicago, 1947. 30p., illus.

The New

STIMSONITE

Reflectors



● All plastic, one-piece reflector formed by fusing a Lucite back piece with the well-known Stimsonite Reflector. No metal parts or gaskets. The new Stimsonite Reflector being complete in itself is dust and moisture proof regardless of age, weather or service.

Available in various sizes, shapes and colors for replacement purposes or new local sign manufacture.

1

Complete line of reflectorized traffic devices:

STOP SIGNS AND PANELS
SYMBOL SIGNS
CAUTION SIGNS
ALPHABETS AND NUMBERS
SIGNALS AND MARKE S
HIGHWAY DELINEATORS
AIRPORT TAXIWAY DELINEATORS
BATONS
BRIDGE END AND CULVERT MARKERS

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Sign mounting accessories

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Activities . . . .

SECRETARY'S COLUMN

Since assuming my present position as Executive Secretary on April 1, 1947, I have received some adverse comments pertaining to the forms now authorized by the Board of Direction for application to membership in the *Institute of Traffic Engineers*. Although such commentary has been of a *minor* nature a recent criticism moves the undersigned to devote this month's column to the subject.

The question has been raised that the procedure is entirely too complicated for those interested in applying for membership. A prospective applicant—once reviewing the forms—decides thereupon to forego the "trouble" of completing them and returning to National Headquarters. It is regretable that there should be any feeling in this matter on the part of *new* applicants. It is even more shocking to learn that it is perhaps the reason that some present members fail to apply for transfer to the next higher grade.

In the early days the membership committee attempted to pass upon prospective applicants on the basis of a single blank form which lists briefly the character of each engagement of the applicant. It soon became impossible for the committee to determine from this brief statement the extent of the applicant's actual traffic engineering experience. In a sincere effort to obtain supplementary infor-

(See HOLMES, page 286)

HOOSE SELECTED BY CHARLOTTE

Herman J. Hoose (Assoc.) has been selected traffic engineer of Charlotte, N. C. To welcome him there, the *Charlotte Observer* published the following editorial:

"With the appointment of Herman J. Hoose as traffic engineer for the City of Charlotte, it appears that we have at least been forced to accept the self-evident conclusion that traffic in a modern city is one of the major problems, ranking with police and fire protection, health and waterworks, and can no longer be considered a mere appendage of another department.

Too long we have tried to solve the complex problem of traffic in an almost hopelessly bottlenecked downtown district by turning it over to men who were able enough in their own fields but were not traffic experts and, moreover, were busy with other duties and could give only part of their time to what should be a full-time job for a specialist.

Although Mr. Hoose comes to us with an impressive record for unscrambling the traffic of larger and more industrialized cities than Charlotte, we do not envy him the task he will have here.

With all of his experience, it is doubtful that he ever saw a business district so bottled up by a quadrangle of railroad yards that apparently have pre-empted most of the outlets and made inner Charlotte a walled city with ingress and egress at only a few narrow gates.

(See HOOSE, page 288)

ITE ASSISTING IN NATIONWIDE TRAFFIC ENGINEERING CONFERENCE PROGRAM

The University of Minnesota was the scene of the *first* in a series of three-day traffic engineering conferences being coordinated by the *Institute of Traffic Engineers* for the coming year. The conferences represent a part of the expanded program of the INSTITUTE to promote wider acquaintanceship among those who are interested in traffic engineering, to provide further opportunity for the exchange of ideas and to establish the foundation for an effective and cooperative traffic engineering fraternity throughout the country.

The Minnesota Traffic Engineering conference, held recently at the University of Minnesota, attracted fifty engineers, public works officials and others who have to do with location, construction, maintenance and operation of streets and highways throughout the state. The conference was sponsored by the University's Center for Continuation Study in cooperation with the Minnesota Department of Highways, the League of Minnesota Municipalities, the *Institute of Traffic Engineers* and the Yale Bureau of Highway Traffic. In addition to traffic engineering subjects, the Conference considered traffic regulations and highway design and planning.

The three-day meeting was highlighted by a series of open panel discussions each afternoon, concentrating on local traffic problems related to the "Subject for the Day". Robert S. Holmes, Executive Secretary, ITE, and James E. P. Darrell, State Highway Traffic Engineer, led the opening day sessions on accident record procedures and problems, parking and traffic survey techniques. The second day was devoted to traffic regulations, including curb parking control, speed zoning, and uniform traffic control devices. Discussion leader Ralph H. Sprungman, Traffic Engineer of Minneapolis, found himself in the middle of a veritable barrage of questions relating to solution of the parking problem. The final day's discussions led by Fred W. Hurd, Research Associate of the Yale Bureau of Highway Traffic, O. L. Kipp, Assistant Commissioner and Chief Engineer, Minnesota Department of Highways, and C. C. Ludwig, Executive Secretary of the League of Minnesota Municipalities, was directed toward Traffic Design and Planning.

INSTITUTE members making a valuable contribution to the Minnesota conference, in addition to Holmes, Hurd, Darrell and Sprungman, were Kermit B. Rykken, I. S. Shattuck, and John A. Swanson.

Other conferences are scheduled at the University of Missouri, beginning June 29th, Los Angeles on July 14th, and at Oregon State College July 27th. Conferences are also being planned in Florida and Texas in the coming months.

Governor Beauford H. Jester of Texas called a Governor's Highway Safety Conference in Dallas on March 19th and 20th. This conference was held in conjunction with the Annual Convention of the Texas Safety Association.

The committee on Engineering is headed by Gibb Gilchrist, President of Texas A&M College and Chairman of the Committee on Engineering, the President's Highway Safety Conference. The committee roster has 26 names including W. C. Brandes and Tom E. Willier. Secretary of the Committee is Fred Bennett, Engineer of Traffic Services, Texas Highway Department.

I T E PERSONALS

DONALD M. McNEIL, Pittsburgh traffic engineer, speaking before the Washington, D. C., Advisory Board and Women's Safety Committee of the American Automobile Association described Pittsburgh's parking authority, a governmental agency which plans to finance a $35,000,000 off-street parking program by sale of bonds. He said such a method of dealing with the problem was made necessary by the "woeful failure" of private capital to handle it." The Pittsburgh parking authority intends to float a 30-year bond issue by competitive bidding and has a good prospect of getting its funds at 2½ per cent interest, he said. The authority has in mind charging 35 cents a day for parking on fringe lots and a scale of 15 cents for the first hour, 10 cents for the second, 10 cents for the third and 25 cents for each hour thereafter in the garages intended for short-term parkers, Mr. McNeil told the meeting.

BUD YOST is the transportation officer of a division of army reserves in Detroit.

LLOYD (DUTCH) REID has resigned his position as traffic engineer of Detroit.

HENRY EVANS advises us that **LLOYD BRAFF** has departed for Caracas, Venezuela to begin work on a transit consulting job there for the De Leuw, Cather organization. He will be there for approximately three months and will probably return at a later date.

Three more members of the Michigan Section of the I.T.E. have become registered professional engineers recently. They are **JOHN DOBELEK** and **ARTHUR GIBSON** of the Traffic Design Division of the Detroit Traffic Engineering Bureau, and **EDWARD I. SHULMAN**, Metropolitan Traffic Engineer of the Michigan State Highway Department. All of these men registered as civil engineers because the Michigan board does not give certificates in traffic engineering. With the addition of these men, the Michigan section can now boast that almost half of its members are registered professional engineers.

S E C T I O N N E W S

ILLINOIS STUDENT CHAPTER

This letter will complete my last official act for the Illinois student chapter. New officers have been elected for the coming semester and are as follows: president, Curt A. Matyas; vice-president, Charles L. Holman; secretary-treasurer, Robert A. Kroening.

They took office at the January 28th meeting. This was a special meeting to hear a guest speaker, Mr. Matthew C. Sielski. We had a dinner for Mr. Sielski and the members before the meeting, affording us a better opportunity to become acquainted with Mr. Sielski.

I would like to give you a brief resume of the chapters activities during its first semester as an organization. Seven meetings have been held since October 28, 1947, when the group first met to discuss activation. These meetings, with the exception of the January 28th meeting, have all been of a discussion type with the members discussing current traffic problems in the local region, the extent of these problems, the analysis of the field data taken on the surveys, and possible solutions to some of these problems. These meetings have all run from two to two and one-half hours in duration. One recommendation was made to the city of Champaign which was favorably received and which we feel played an important part in the reorganization of the Traffic Commission. The data obtained on our surveys of the Campus area, along with our findings and recommendations has been compiled into a 2?-page report which has been sent to officials of the University and of the two communities. We realize that it is not as complete as it could be or as nicely published, but we are proud of it considering that it was all done outside of the members regular schoolwork. We feel that we have accomplished more in the short period we have been organized than any of the other student organizations have accomplished in many years of organization, since their activities normally consist wholly of talks by various speakers.

Robert J. Allen, Secy.-Treas.

WASHINGTON SECTION

Thirty six members and guests of the Washington Section met for their regular meeting on January 14 at the Hotel Fairfax. Business included a report by Wm. G. Eliot 3d, on the District of Columbia Engineers License Law, and the introduction of a bill in Congress relating to it.

Program Chairman Gordon Gravelle outlined some proposals for the next meeting on February 18 which is to be the annual social night. Fellow ITE members who happen to be in Washington on that date are cordially invited to attend.

Mr. Louis A. Andriacchi called to the attention of the section the passing of Walter F. Rosenwald and paid a high tribute to Mr. Rosenwald's long and distinguished career in traffic engineering. All present stood in a moment of silent tribute.

The speaker for the evening was O. K. Normann, U. S. Public Roads Administration, who presented an interesting, illustrated lecture on Highway Capacity Studies. Many additional facts were brought out during the discussion period which followed.

We have learned of some of the scores made on the Traffic Engineer's Quiz appearing in the January issue. Most of the scores were in the 50's and 60's. A few were in the 70's. The highest score reported to date was 80, made by Edward H. Holmes.

The sharp eyes of our readers have spotted a mistake in Question 5 relating to the Pittsburgh parking survey. While answer No. 4 is still correct, an unintended misplacement of a decimal point makes answer No. 5 also correct. Thus you are entitled to two more percentage points if you checked answer No. 5 on this question.

It would be appreciated if you would communicate with the writer of these notes, if your score supports or alters the grade curve outlined here.

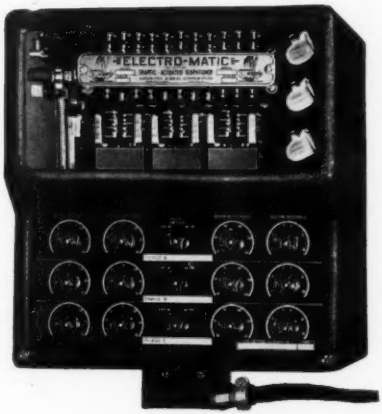
—Martin C. Stark

(HOLMES, *con't. from page 284*)

mation a Detailed Experience Record form was devised. This latter form was carefully designed to cover all of the basic duties and functions of a practicing traffic engineer, or

ELECTRO-MATIC

THREE PHASE CONTROL



Model 826D Dispatcher

- Full or Semi-Actuated Control of a Three Movement Intersection
- Time Extension on all Phases
- Ability to Skip any Phase
- Maximum Efficiency under all Conditions

MANUFACTURERS OF

Traffic-Actuated Signal Controllers — Highway Speed Control Systems
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"Traffic Regulation With Intelligence"

AUTOMATIC SIGNAL DIVISION
EASTERN INDUSTRIES, INCORPORATED
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those persons engaged in related fields of traffic control, transportation, and city planning. The applicant was asked to describe the extent of his work under various classifications. The applicant is not required to complete the detailed record in its entirety and show working knowledge of each and every phase of the traffic and transportation field. He is asked to fill out only the applicable portions of this form relating to the "engagements" specified on the application blank.

At the present time the Institute's application forms are no more complicated than any of the other founder engineering societies. In addition, founder societies have a desirable adjunct to their study of prospective applicants; i. e., an interview by a Board of Examiners. It is hoped that at some future date the membership of the INSTITUTE will have sufficient geographical distribution to provide interviews for the purpose of assisting applicants in filling out the detailed experience record. Having filled out three INSTITUTE applications I can truthfully state from personal experience that concentrated effort does not require more than 30 to 60 minutes of an individual's personal time. If the individual is too busy during the working day, it is not unreasonable to expect him to set aside this minimum time on his own. Otherwise, it would appear that his interest in application is only lukewarm and not worth the "trouble".

In order to maintain its professional standing among the founder societies the INSTITUTE must continue its present method of examining applicants' qualifications. Seventeen years of practical experience has resulted in the present methods. The attitude on the part of a few individuals is not in the least alarming. National Headquarters continues to receive applications, complete in every detail, on almost a daily basis. At present writing, if this flood of applications continues, it appears very likely that the next Yearbook of the INSTITUTE will show an official roster of over 500 members. With such enthusiasm and interest among engineers in all parts of the country we cannot concern ourselves with the *minority* who haven't the time to apply. The National Headquarters, the Board of Direction and the Membership Committee always welcome constructive suggestions, and will be happy to receive notice of a more workable plan for membership applications.

ROBERT S. HOLMES

(HOOSE, *con't. from page 284*)

We can already hear the howls of protest that will go up when Mr. Hoose tells the city that its only hope is to dig its way out by spending a couple of million to tunnel under the imprisoning railroad yards, and the yelps of pain from property owners when he asks them to set their building lines back to make room for wider streets.

And, when he begins to reform our haphazard parking system, traffic tickets will multiply, and squawks will resound from the height of Thomasboro to the creek bottoms of Eastover.

Yet only by such drastic methods can we bring any sense out of the confusion of our downtown traffic. In our amateurish way we have gingerly touched the problem here and there but have never had the courage to slice through to the heart of it. We have neglected a chronic condition until it has become acute and requires a major operation.

At last we have quit trying to be our own doctor and have called in the specialist. We shall have only ourselves to blame for the consequences if we refuse to submit to the operation that he will recommend."

Personalities . . . .

A pioneer in the field of traffic engineering, Harry E. Neal has been active in this field since 1921 when he was designated to organize and head up a traffic engineering department in the Ohio Department of Highways. He was one of the first, if not the first, state traffic engineers in the United States.

A native of the Buckeye State, Mr. Neal was graduated from high school at Lancaster, Ohio, and from the College of Engineering at Ohio State University. After leaving college he was employed by one of the large public utility companies in Ohio and later joined the staff of the Ohio Department of Highways.

After joining the Highway Department he became interested in traffic upon acquiring his first car, a Model T Ford by the way, and traffic thereupon became his major interest. His interest in the subject of traffic control, safety and facilitation led him to a study of traffic control devices and other measures for the control and safety of vehicular traffic on the state highway system in Ohio. He interested the Director of Highways in a plan for complete marking of the state highway system and as a result, on July 1, 1921, he was designated to organize and head up the Traffic Bureau, now the Division of Traffic and Safety, in the Ohio Department of Highways. He has remained in this capacity ever since.

(See NEAL, *page 292)*

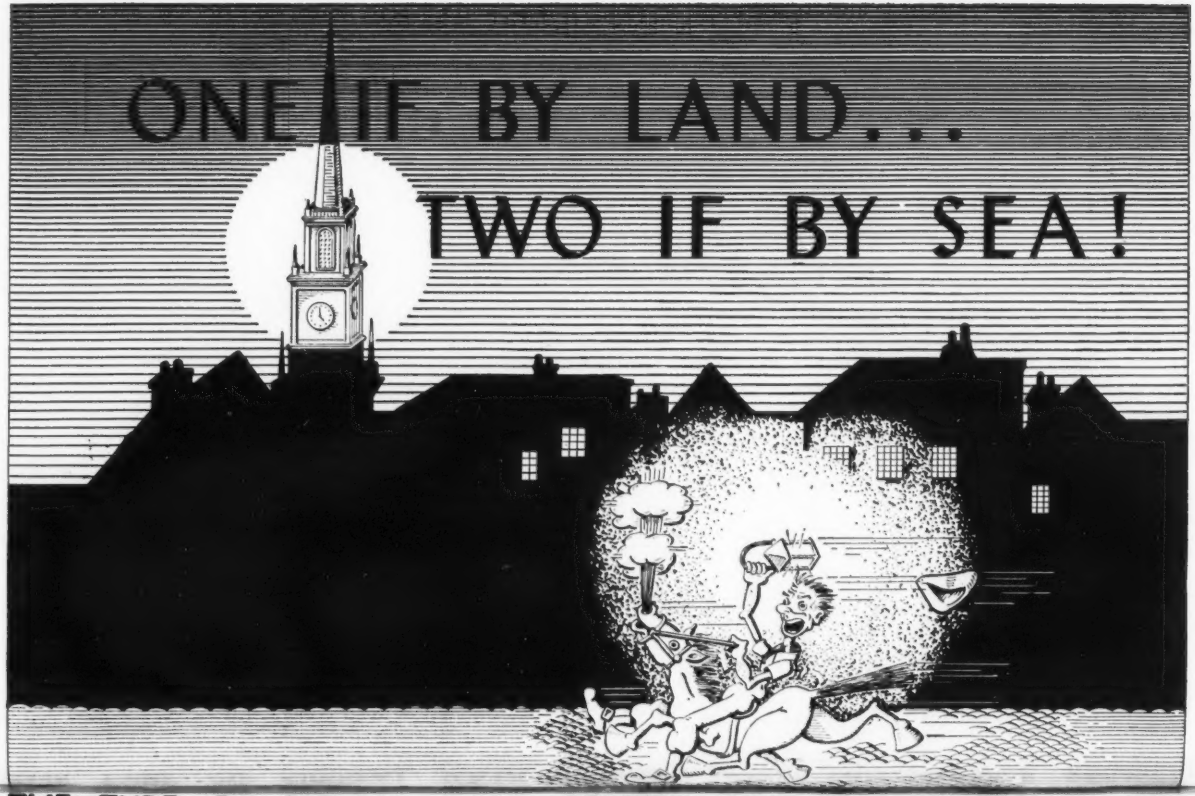
Guy Kelcey got into traffic work in 1920 when possibilities appeared narrow; there were no traffic engineers, no traffic officers and not very much traffic. The field was wide open. Successful solution of a number of bad intersection problems in several parts of the country soon catapulted Kelcey to modest fame.

Blackstone Studios, Inc.

Sharp turns, T-end roadways and narrow pavements abounded; driver regulations were limited and drivers were green. Intersections were, then as now, major headaches. Public concern about traffic accidents was growing in some heavily populated areas. There was conversation but little action and there were no appropriations for traffic improvements.

At this time the American Gas Accumulator Co. asked Kelcey to explore the highway traffic field to find if their experience in safeguarding marine navigation throughout the world could be successfully applied to the street and highway problem. Study disclosed that, at most congested or hazardous locations and street intersections, difficulties arose from faulty design as well as from bad driving upon which all troubles were usually blamed. Guy undertook to find means to correct or offset these faults, on a problem to problem basis, and he says he got mostly bad ones. He was particularly beset by difficult squares,

(See KELCEY, *page 292)*



THE TYPE OF SIGNAL PAUL REVERE AND HIS PEOPLE RELIED

THE TYPE OF SIGNAL PAUL REVERE AND HIS PEOPLE RELIED UPON FOR SAFETY HAS LONG VANISHED IN BOSTON . . .

Today in the wide streets overarched by spreading maples as well as in its quaint, narrow streets, Boston is employing every modern scientific means to give equally full protection to its pedestrians as well as its motorists. BOSTON IS PURCHASING EAGLE SIGNALS AND CONTROLLERS FOR ITS CITIZENS PROTECTION.

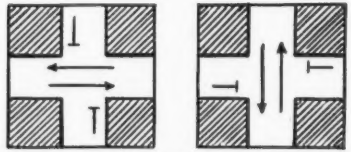
HERE'S WHAT BOSTON IS USING . . .

Normal sequence, interrupted by a pedestrian interval, whenever needed. The pedestrian interval interrupts the normal sequence, by pedestrian actuation only, in two distinct ways:

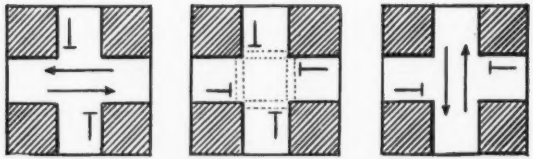
1. **In the Inter-Connected or Non-Inter-Connected Progressive Systems.** Upon pedestrian actuation, a pedestrian interval is introduced into the normal cycle. A memory circuit causes this interval to be introduced during the "main street green." This automatically shortens the "main street green" by a time interval equal to the pedestrian interval.

2. **In Isolated Intersections** — Where the time cycle can be increased with no effect upon adjacent intersections, auxiliary timing equipment allows the total time cycle to be extended whenever the pedestrian interval is needed.

This arrangement has a distinct advantage in that it permits the "main street green" and all other intervals to have the same time allotment as in the normal sequence, extending the **total cycle** equal to the time allotted for the pedestrian interval.



Normal Sequence



Pedestrian Period Added
(By Pedestrian Actuation Only)

Plan for future growth with

EAGLE Signal Corporation

SAFEGUARDING TRAFFIC FOR OVER 20 YEARS

MOLINE - ILLINOIS

(KELCEY, *Con't from page 289)*

plazas and other pavement areas to which the only good answer was that they should be redesigned. Since such an idea was rarely acceptable, he had to find some other economical but effective way to solve the problem.

These developments resulted in the formation of the Traffic Engineering Division of AGA in 1920. During the next 10 years, this Division under Kelcey's direction performed a valuable service in all parts of the United States and a number of foreign countries until a nucleus of local traffic specialists appeared. These initial efforts led to the development of many of the devices or tools to control, regulate and safeguard traffic now commonly used and resulted too in gradual adoption of channelization methods.

About 1920, local officials in New England had evolved, on a cut-and-try basis, methods of safeguarding and reducing congestion at bad street intersections and large areas by stanchion installations. Some of these treatments worked and others failed. Observation and study disclosed the reasons. Many of the principles applied in the horizontal and vertical separation of traffic flows on present expressways and the channelization of traffic everywhere had initial demonstration in the cut-and-try applications of these New England stanchion treatments.

While these measures of the early 1920's now appear rather obvious, they were then new, unproved and novel. As time progressed they were found to work and are now rather universally applied.

It was from these observations and study of a wide variety of problems that Kelcey identified principles, evolved the nomenclature of channelization and prepared practical examples contained in an article, "Channelization of Motor Traffic" published in the Proceedings of the American Society of Civil Engineers in 1939. This article attracted wide attention at the time. His great disappointment was that, while the article was ready ten years earlier, the importance of the subject was not sufficiently recognized to arrange for its publication without prohibitive personal cost.

Starting in 1922, Kelcey prepared articles on various traffic subjects for publication and has presented papers and lectures at intervals since. From 1926 he was visiting lecturer for 15 years on traffic before Professor Charles J. Tilden's classes in transportation at Yale, and has frequently spoken on traffic and transportation subjects before other groups of students and technical societies.

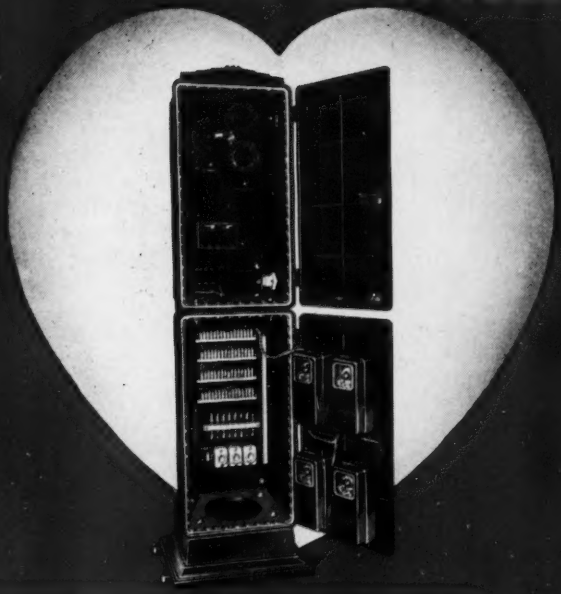
Toward the end of the 1920's there were enough traffic men to form a small nucleus with a common interest at meetings and conventions. These men made a practice of avoiding convention banquets partly because they cost five dollars, which few traffic men could then spare, partly because banquets were not amusing but largely to get together to talk traffic in someone's room; and it was often Kelcey's because he usually brought apple jack along. These bull sessions, which lasted sometimes till daybreak or later, or until the apple jack ran out, grew larger and larger till they finally became the *Institute of Traffic Engineers.*

(NEAL, Con't form page 289)

The first step in developing a system of marking the state highways in Ohio was the designation of the state highways by numbers and the design of markers, warning, directional and informational signs, and the development of a system of pavement marking.

This led to the establishment of a Sign Shop and the development of methods for sign production on an

The HEART of traffic control is the CONTROLLER



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(NEAL, *con't. from page* 292)

efficient basis. The Sign Shop operated by the Division of Traffic and Safety of the Ohio Department of Highways is now one of the largest state operated sign plants in the United States and is a model of its kind.

In the beginning no equipment was available for pavement marking and it was necessary to design and build equipment for this work. From the first manually propelled and operated pavement stripers to the present motorized stripers all such equipment was designed and built under Mr. Neal's direction.

The complete marking of the state highways in Ohio met with public favor and definitely established the infant Traffic Bureau as an essential part of the organization of the Department of Highways. This made it possible to expand the activities of the new department to include other phases of traffic engineering. The department under Mr. Neal handles all matters pertaining to traffic control and safety on the state highways in Ohio. It also cooperates with and assists municipalities in local traffic studies.

One of the functions of the Division of Traffic and Safety is the direction of the program of state-wide traffic safety activities. Mr. Neal is a member of the Governor's Traffic Safety Coordinating Committee of State Officials and is also Executive Secretary of the Ohio Traffic Safety Council, the citizens supporting group.

Mr. Neal is one of the Vice-Presidents of the *Institute of Traffic Engineers* and is also a former member of the Board of Direction of the Institute and a member of the Handbook Committee. He is a member of several national committees. He has been a member of the Joint Committee on Uniform Traffic Control Devices since its inception and is Chairman of the Sub-Committee on Signs. He is the representative of the American Association of State Highway Officials on the Highway Traffic Standards Committee of the American Standards Association. He was a member of the Joint Committee on Traffic Engineering Functions and Administration and Chairman of the Sub-Committee on Traffic Administration which prepared the section on Traffic Administration in the Manual on Traffic Engineering Functions and Administration which is now on the press. Mr. Neal is also First Vice-Chairman of the Traffic Section of the National Safety Council.

Mr. Neal has presented talks on traffic subjects at the University of Texas, Purdue University, Yale Bureau of Highway Traffic, Ohio State University, Michigan Highway Conference, Virginia State Safety Conference and others.

He is a Registered Professional Engineer and in addition to being a member of the *Institute of Traffic Engineers* he is a member of the National Society of Professional Engineers, the Ohio Society of Professional Engineers and Phi Delta Theta Fraternity.

Mr. Neal is a bachelor and offers no excuse or explanation for his not being married. He is an Ohio State football fan but says he hasn't had much to cheer about lately. He likes to travel and also likes golf but his game is not what he would like it to be. He uses as an alibi for his golf score an airplane crash of several years ago in which his left arm was shattered. He admits the arm is as good as new but it gives him something to blame for his failure to shoot par golf.

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